

**REMARKS**

Claims 1-90 are pending. Claims 31-90 have been withdrawn. Independent claims 1 and 16 have been amended. No new matter is believed to be added by these amendments. Claims 12 and 27 have been canceled. Claims 2-11, 13-15, 17-26, and 28-30 depend from claims 1 and 16, respectively. Applicants thank the Examiner for the telephonic interview on May 6, 2009 to discuss the differences between bioluminescence and fluorescence.

In the present Office Action, claims 1-30 are rejected under 35 U.S.C. §103(a) as being unpatentable over, “Combined Ultrasound and Fluorescence Spectroscopy for Physico-Chemical Imaging of Atherosclerosis” by Warren, *et al.* (“Warren”) in view of Tomography – Definition from Dictionary.com. Applicants thank the Examiner for withdrawal of the previous rejection over U.S. Patent No. 6,490,476 (“Townsend”). Applicants respectfully requests allowance of all the pending claims in view of the subsequent remarks regarding the above-mentioned independent claims.

**I. Claim Amendments**

Independent claim 1 has been amended to further clarify that the claimed invention pertains to bioluminescence. To that effect, claim 1 specifically recites:

a ***bioluminescent*** imaging device configured to produce a bioluminescent source distribution in the object based on the mapped optical properties, wherein the bioluminescent source distribution is produced based on a single- or a multi-spectral radiative transfer equation ***without an external excitation source term*** or an approximation to the single- or multi-spectral radiative transfer equation ***without an external excitation source term***.

(Emphasis added).

Claim 16 has been similarly amended and now recites a:

***bioluminescent*** imaging device comprising one or more ***imagers sensitive to one or more bioluminescent sources*** of spectral characteristics, wherein the bioluminescent imaging device is configured for detecting ***bioluminescent signals*** emitted from the object using the one or more imagers to produce a bioluminescent source distribution in the object based on the mapped optical properties, wherein the bioluminescent source distribution is produced based on a single- or a multi-spectral radiative transfer equation ***without an external excitation source term*** or an approximation to the single- or multi-spectral radiative transfer equation ***without an external excitation source term***.

Support for these amendments can be found in the detailed description at least in paragraphs 3, 45 and 54-60. No new matter is added by these amendments.

## **II. Rejections Under 35 U.S.C. §103(a)**

In the Office Action, claims 1-30 were rejected under 35 U.S.C. §103(a) as unpatentable over Warren in view of Tomography – Definition from Dictionary.com. Applicants first submit that, for a *prima facie* case of obviousness, the cited prior art reference “must teach or suggest all the claim limitations” MPEP § 2143. Thus, if the reference does not teach each of the claimed limitations, a finding of obviousness fails. In addition, the Patent Office has the burden under § 103 to establish a *prima facie* case of obviousness, which can be satisfied only by showing some objective teaching in the prior art would lead one to combine the relevant teachings of the references. *See In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). As such, an Applicant, to overcome an allegation of obviousness can show that the cited prior art references (when combined) do not teach or suggest all the claim limitations or that there is not an objective teaching in the prior art that would lead one to combine the relevant teachings of the references.

Furthermore, Applicants hereby traverse each and every instance in which it is asserted that a claimed feature is “well known” in the art. *In re Zurko* has established that taking of

Official Notice is only appropriate in very rare instances not applicable here. 258 F.3d at 1379, 1386; 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Therefore, if the Examiner has a reference to assert against a claim limitation asserted to be well known, the Examiner is requested to produce it or allow the claim. Moreover, the Official Notice improperly dissects the claim, effectively extracting a proposition from the claim that is not in the claim “as a whole” when viewed as required by 35 U.S.C. § 103(a).

Independent claims 1 and 16 were rejected as being obvious in light of Warren in view of Tomography – Definition from Dictionary.com. However, Warren in view of Tomography – Definition from Dictionary.com fails to disclose, teach, or suggest at least the reconstruction of a bioluminescent source distribution. Warren in view of Tomography – Definition from Dictionary.com further fails to teach the use of bioluminescence. The prior art references fail to teach a bioluminescent imaging device configured for detecting bioluminescent signals. Accordingly, the prior art also does not teach the reconstruction of a bioluminescent source distribution wherein the bioluminescent source distribution is produced based on a single- or a multi-spectral radiative transport equation without an external excitation source term or an approximation to the single- or multi-spectral radiative transport equation without an external excitation source term. As the claims are directed to bioluminescence, there is no external excitation source term in the radiative transport equation, as there is no external source. Applicants therefore respectfully submit that Warren in view of Tomography – Definition from Dictionary.com does not render obvious Applicants’ independent claims 1 or 16.

Warren teaches a combination of ultrasound imaging and fluorescence source estimation whereas the instant application is directed to reconstruction of a bioluminescent source distribution based on mapped optical properties. The differences between bioluminescence and

fluorescence are very significant. Applicants have enclosed an article discussing bioluminescence and fluorescence for the Examiner's convenience, Multimodality Radionuclide, Fluorescence, and Bioluminescence Small-Animal Imaging, Park, *et al.*, Proceedings of the IEEE, Vol. 93, No. 4, April 2005. Bioluminescence is the emission of visible light either voluntarily or involuntarily. Fluorescence is the involuntary emission of light when an organism is being subjected to an external light source. Fluorescence imaging/tomography requires an external laser source, allowing active probing into an object to be imaged, whereas bioluminescence imaging/tomography as claimed does not use any external laser source (passive imaging). In this passive imaging mode, bioluminescent light is weak. The resultant signal-to-noise ratio is not compromised with bioluminescence tomography as compared to fluorescence imaging. Mathematically and physically, fluorescence imaging and bioluminescence imaging have different governing equations, which demand quite distinct imaging system configurations. Due to the fundamental differences in forming images and configuring systems, the teachings in Warren will produce unexpected results in comparison to those described and claimed in the present application. Applicants therefore stress that there is **no** teaching of bioluminescence tomography anywhere in Warren. Accordingly, there is **no** teaching of reconstructing a bioluminescent source distribution. There is no person of skill in the art that could take the teachings of Warren and arrive at the presently claimed invention. Applicants respectfully request withdrawal of the rejection and allowance of claims 1-11, 13-16, 17-26, and 28-30 as the cited prior art references do not teach or suggest all the claim limitations.

**III. Conclusion**

Warren in combination with Tomography-Definition from Dictionary.com does not render obvious any of the pending claims. As the Court noted in *In re Fine*, “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” 5 U.S.P.Q.2d 1569, 1600 (Fed. Cir. 1988). Since the Applicants respectfully assert that all the pending independent claims are allowable, all the pending dependent claims are also allowable. Thus, Applicants respectfully request allowance claims 1-11, 13-16, 17-26, and 28-30 in view of the previous remarks and amendments. The Examiner is invited and encouraged to contact directly the undersigned if such contact may enhance the efficient prosecution of this application to issue.

A one-month extension of time filing fee for a small entity (\$65.00) is submitted. The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

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